

ACES

<http://www.aces.org.au>

Cooperation Case Note:

Workshop related to ACES with APRU

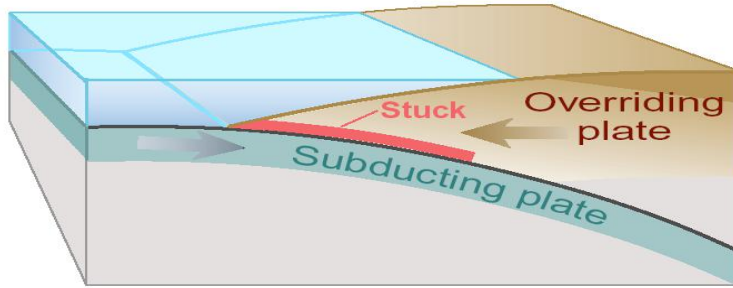
<https://apru.org/event/2017-gnss-tsunami-early-warning-system-workshop/>

Yongxian Zhang

Vice Chairperson of ACES

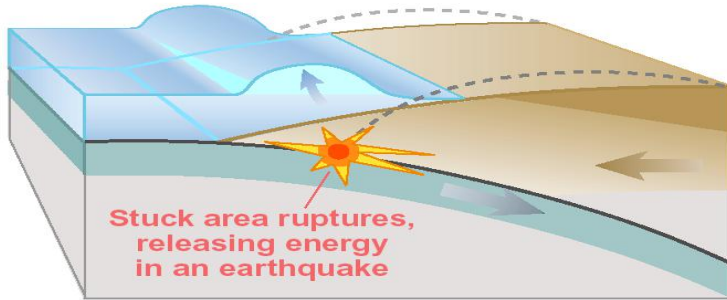
China Earthquake Networks Center, Beijing, China

Earthquake and Tsunami

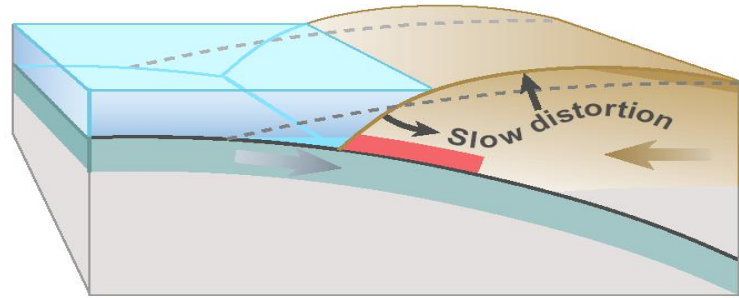


Vertical Slice Through a Subduction Zone

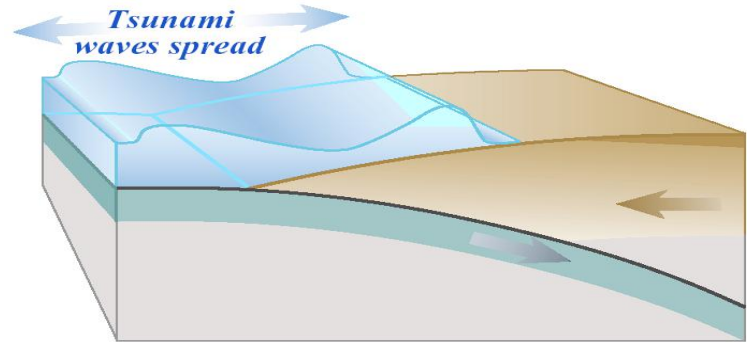
Earthquake starts tsunami



B. During an Earthquake



A. Between Earthquakes



C. Minutes Later



Time: 2017

Venue: Sendai, Japan

Event: 2017 GNSS Tsunami Early Warning
System Workshop

Motivation: Global Navigation Satellite System to
Enhance Tsunami Early Warning

Sponsor: National Aeronautics and Space Administration (**NASA**)
Systems

Participants: 50 scientists from the world
Tohoku University, Sendai, Japan,
APRU-IRIDeS Multihazards Program
Global Geodetic Observing System

- Main Goals:**
- (1) Identify GNSS resources to develop real-time GNSS early warning capabilities throughout the entire Pacific Rim region;
 - (2) Assess data gaps in the current Pacific-wide networks, develop strategies on the best approaches to fill the gaps;
 - (3) Review the state-of-the-art early warning approaches with an eye towards emergency response community.

Organizing Committee:

(Former ACES executive director)

John Rundle, University of California, Davis (**Chair**)

Shunichi Koshimura, Tohoku University, Sendai, Japan

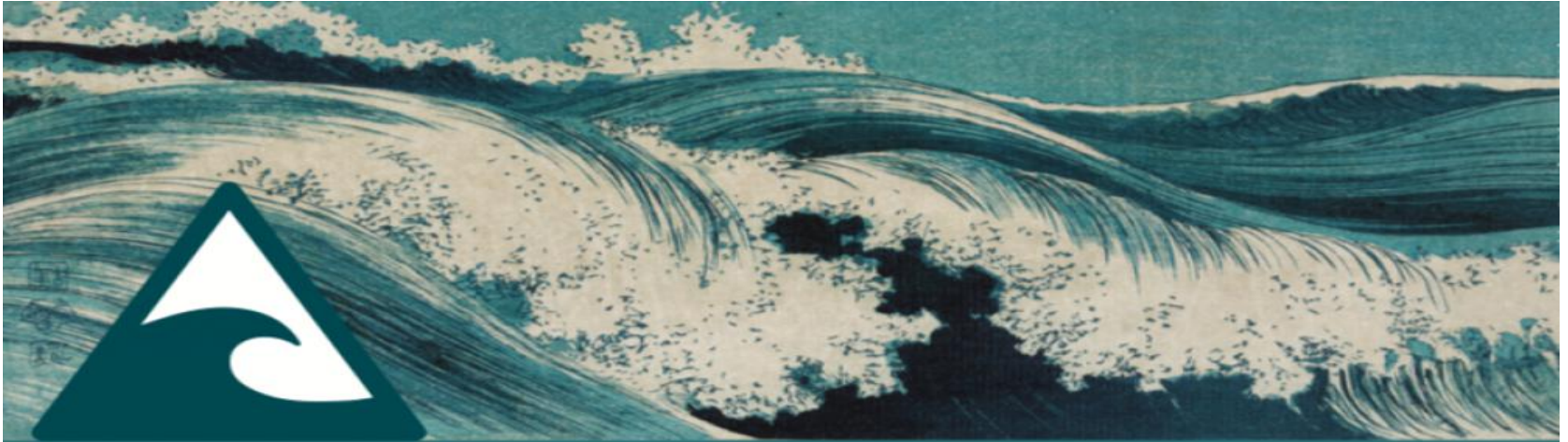
Yusaku Ohta, Tohoku University, Sendai, Japan

John LaBrecque, Global Geodetic Observing System

Yuichi Ono, Tohoku University, Sendai, Japan

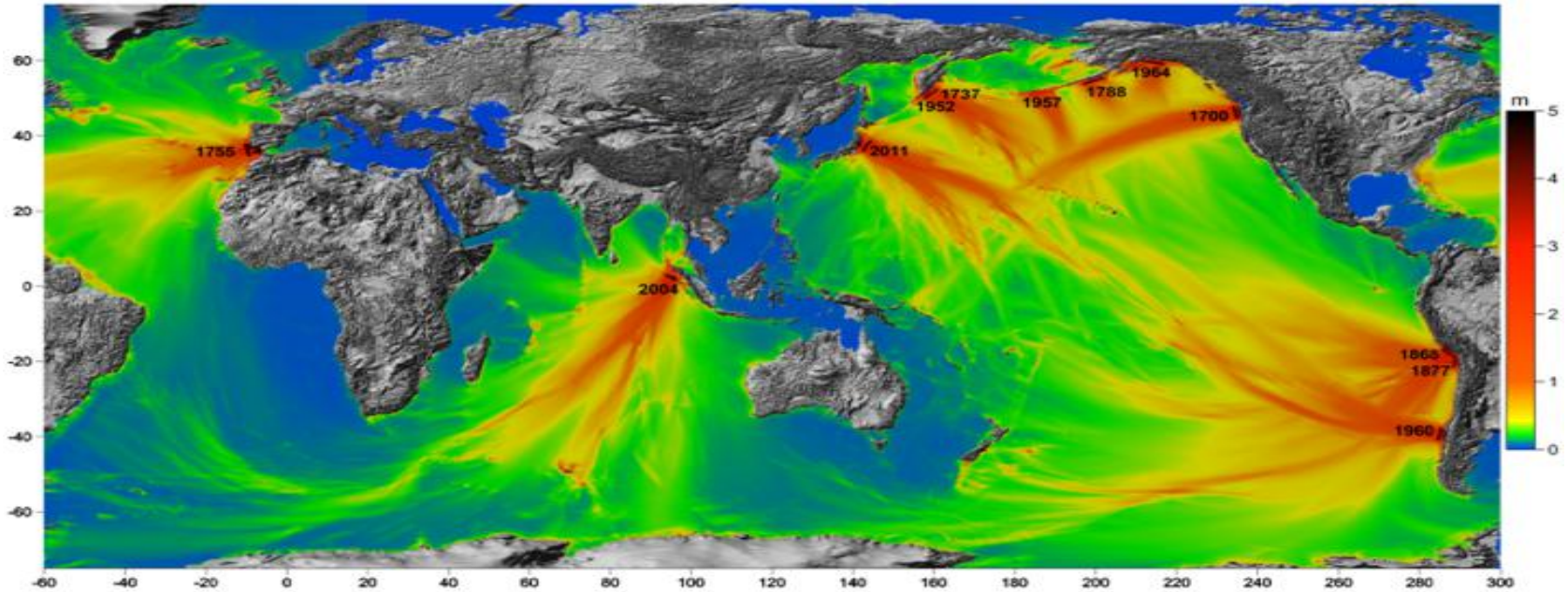
Takako Izumi, Tohoku University, Sendai, Japan

Output: Scientific Report



**Global Navigation Satellite System
to Enhance Tsunami Early Warning Systems**

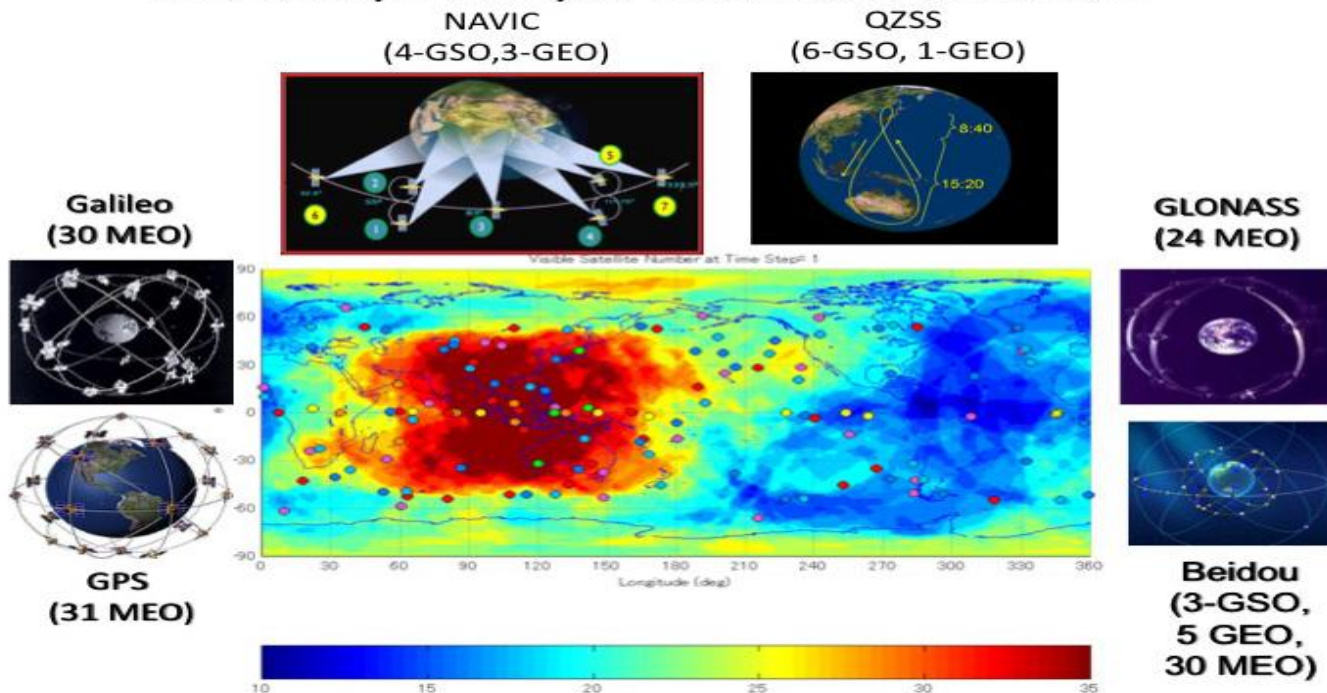
Historic Global Tsunamis and Their Propagation Paths



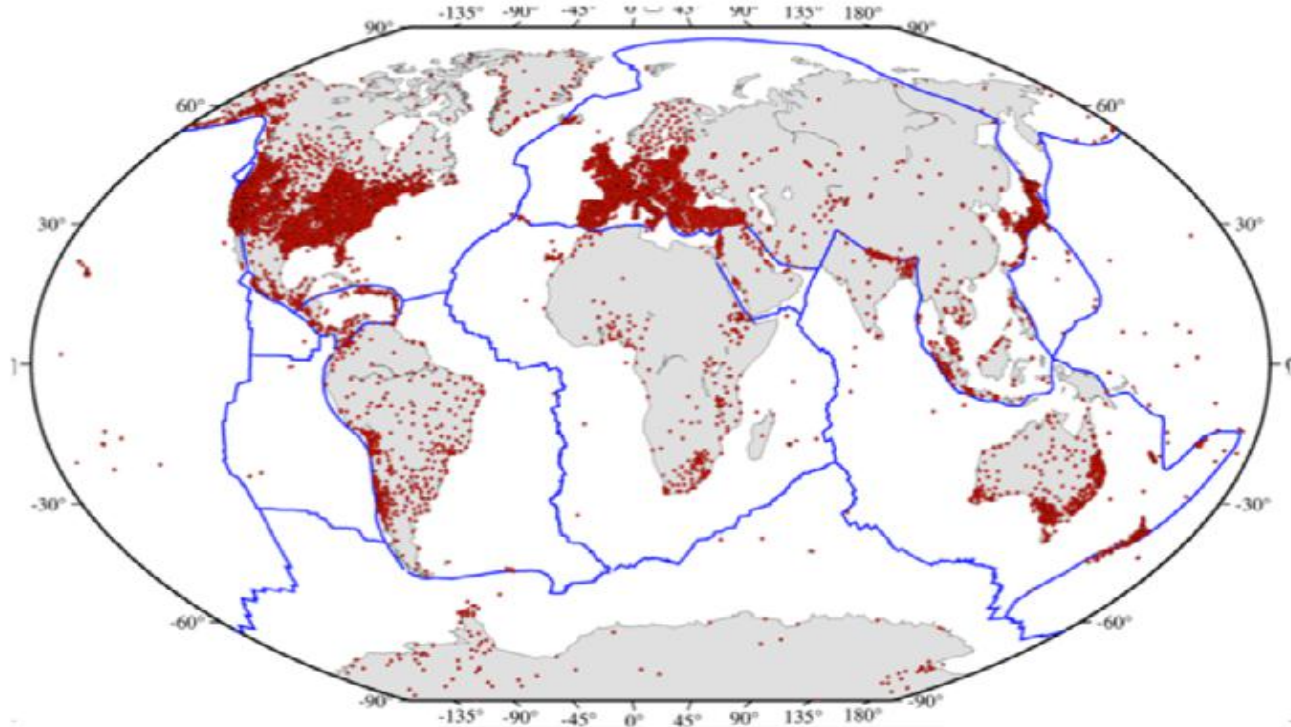
(Gusiakov et al, 2015).

GNSS Satellites For the Indo-Pacific Region

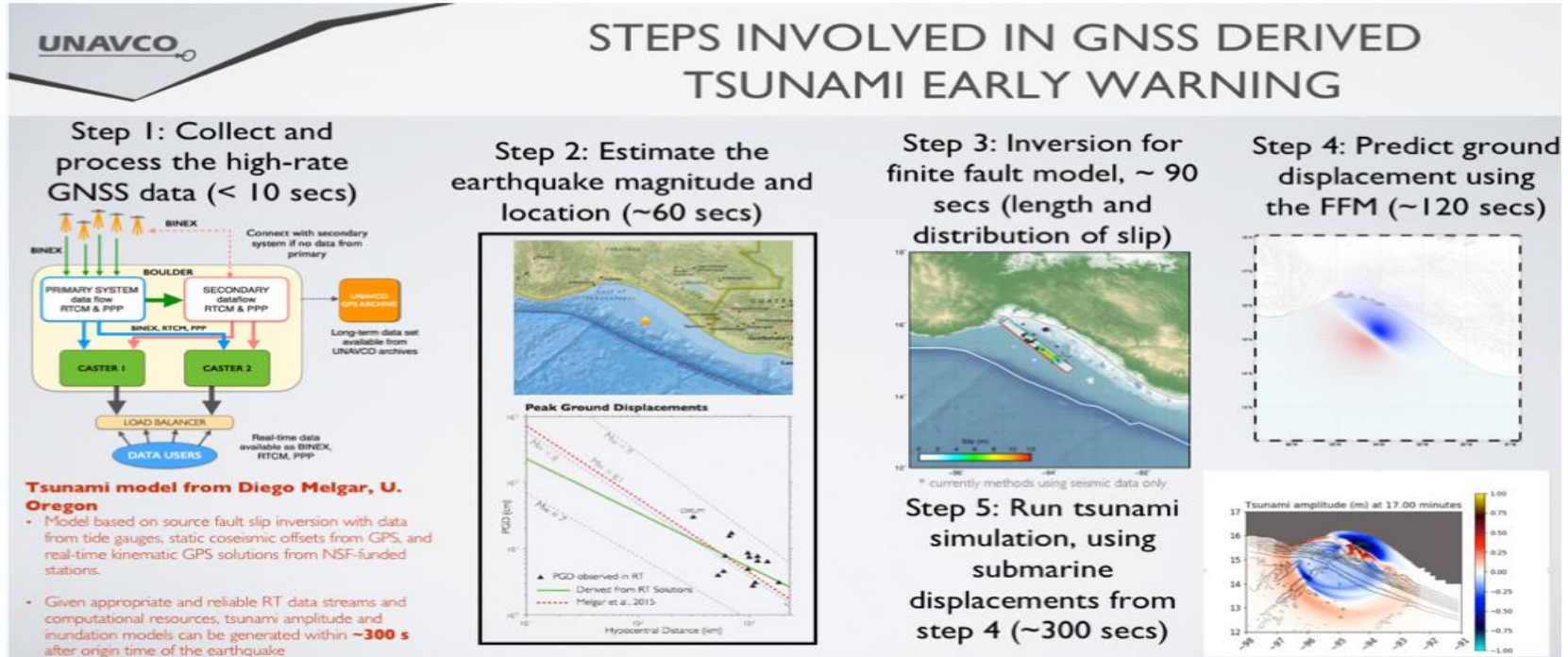
The 2025 Multi-GNSS Constellations 115-MEO, 9-GEO, 13-GSO GNSS Satellites



GNSS Receivers

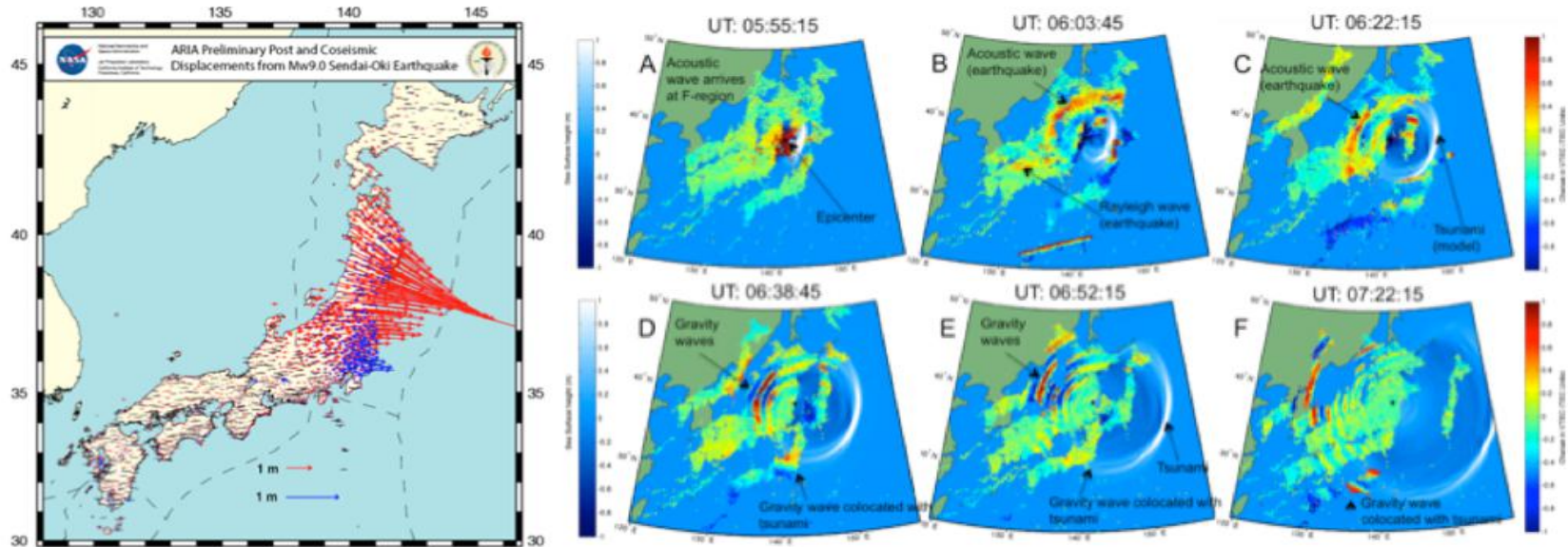


GTEWS Analysis Process



to provide accurate tsunami warning in less than 5 minutes from earthquake occurrence

GTEWS Measurements by GEONET



GEONET: Japanese ground network of 1200 GPS receivers
GTEWS: GNSS Tsunami Early Warning System

Key Findings:

(1) Academics assessed what resources would be required to develop real-time GNSS through the Pacific-Rim.

(2) Researchers helped to determine the usefulness of the technology, a needed measure before implementation can be considered.

(3) The workshop helped identify the data needs of possible future collaboration between Asia-Pacific Economic Cooperation (APEC) economies and the world.

Inspiration:

To promote broader cooperation within the Indo-Pacific community of APEC economies for the purpose of identifying strategies needed to understand the data needs for the Pacific-wide geophysical activities.

Thank you for your attention!

